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Analysis of Electronic Medical Record Information Systems in Outpatient Services Jalan Klinik Kusmahati Dua Sukoharjo

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Abstract — The form of advances in information technology in the health sector is Electronic Medical Records (RME). Basically electronic medical records use electronic methods for collecting, storing, processing and accessing patient medical records in health care facilities that have been stored in a multimedia database management system that collects various medical data sources. The purpose of this study was to analyze and implement a medical record information system for outpatient services at the Kusmahati 2 Sukoharjo Clinic. This research uses a descriptive research type that describes the data as a result of research. The subjects of this study were medical record officers, doctors, pharmacy installations and cashiers. While the object of this research is the implementation of the Electronic Medical Record System at the Kusmahati 2 Sukoharjo Clinic. The results of this study indicate that a web-based electronic medical record has been designed for the Kusmahati Dua Sukoharjo Clinic and is ready to be submitted to the owner of the Kusmahati Dua Sukoharjo Clinic for follow-up. Researchers suggest that electronic medical records be implemented in service activities at the Kusmahati Dua Sukoharjo Clinic so that they can be further evaluated and developed.

Keywords – Electronic, Electronic Medical Records, Medical Records Systems

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1. INTRODUCTION

Current technological developments which are classified as very fast and rapidly developing can have a very big influence if utilized to the fullest. One sector that is very important to get great attention from the government is the health sector. The health sector is a sector that has the potential to be integrated with the presence of currently developing information technology [1]. Information system is a system that has the ability to collect information from all sources and use various media to display information [2]. Sistem informasi berbasis WEB merupakan sebuah kompenen yang saling terhubung satu sama lain. Has the function and ability to collect, process, store and convey information in the form of sound,

images, text and information presented in the form of hypertext [3].

An information system is a system within an organization that meets the needs of daily transaction processing that supports organizational managerial functions in the strategic activities of an organization to be able to provide certain external parties with the necessary reports [4]. According to [5]The use of information technology in the health sector plays an important role in improving the quality of health services.

The current implementation of health information systems has the potential to improve the performance of health facilities, save operational costs, and increase patient satisfaction.

Medical record is a file containing notes and documents about patients containing identity, examination, treatment, other medical procedures at health care facilities for outpatient care, inpatient management, both managed by the government and private sector [6]. The form of information technology advances in the health sector is the Electronic Medical Record (RME). The benefits that can be obtained include economic aspects such as cost savings, cost avoidance, increased revenue, contribution to profits, and increased productivity. Electronic Medical Record is a patient's lifetime medical record record in electronic format regarding a person's health information that is written down by one or more health workers in an integrated manner in every meeting between the health worker and the patient. Every other health worker who works at the clinic must have a Registration Certificate (STR) and a Work Permit (SIK) or Practice Permit (SIP) according to the provisions of the regulations (Permenkes No.9/Menkes/Per/I/2014) [7]. According to [8]a database or database is an important component in an information system, because it is the basis for providing information, determining the quality of information (accurate, timely and relevant). The model that will be used for designing Electronic Medical Record Information in Outpatient Services Jalan Klinik Kusmahati 2 Sukoharjo is *Waterfall.* The *Waterfall* method is a type of application development model and belongs to the classic life cycle, which emphasizes sequential and systematic phases. For the development model, it can be analogous to a waterfall, where each stage is done sequentially from top to bottom [9].

Based on previous research and the results of preliminary studies, the researcher is interested in conducting research on the topic "Analysis of Electronic Medical Record Information Systems in Outpatient Patient Services" Kusmahati Clinic Road 2 Sukoharjo".

2. RESEARCH METHODS

This type of research uses descriptive research that describes data as a result of research. The subjects of this study were medical record officers, doctors, pharmacy installations and cashiers. While the object of this research is the implementation of the Electronic Medical Record System at the Kusmahati 2 Sukoharjo Clinic. SDLC development method. Collecting data using observation and interviews. Methods of data collection include primary and secondary data. Data analysis carried out was data collection, data reduction, data presentation and drawing conclusions.

3. RESULTS

Stage First from analysis and record design medical electronic is analysis need with do interview in-depth study of doctors and medical record workers at the Kusma Hati Dua Sukoharjo Clinic. The flow of services at the Kusma Hati Dua Sukoharjo Clinic starts from the registration section. The medical record officer will write down patient data that visits the register book. Then specifically for BPJS participant patients, data will be input into the p-Care *software.* Then the medical record officer will deliver the patient's medical record file to the doctor's room. The patient will be examined according to his complaint and then the data will be recorded in the medical record file. The doctor will write a prescription then the patient can pick up the medicine at the pharmacy and then complete the payment administration. The flow is based on the statement of the respondent.

The electronic medical record must be able to store and display a history of previous patient visits. Risk factors such as smoking behavior, alcohol consumption, exercise, diet, allergy

records, and patient's family history of disease. This is based on the statements of respondents in in-depth interviews.

"*What is recorded in the medical record is the SOAP examination result. Subjective, Objective, Assessment, Plan. At the clinic, there is indeed a record of a history of diseases that have been suffered by close relatives, for example, diseases that have been suffered by the father and mother, whether there are hereditary diseases or not. Then there are also notes related to risk factors such as smoking habits, exercise, food diet, allergies, so you will see for yourself in the medical record file, Miss. " (Doctor 2, in-depth interview)*

The respondent's statement is also supported by the results of the FGD. Based on the FGD results on paper-based medical record files at the Kusma Hati Dua Sukoharjo Clinic and data items on p-Care, it is known that the need for electronic medical record data for family doctors consists of patient identity, visit history, allergy notes, lifestyle, immunizations, history of surgery, past medical history, and family history of disease as found in Table 3.1

Table 1 Kusmahati Dua Sukoharjo Electronic Medical Record Data Needs

No	Type Data	Items Data
1	Identity Patient	Full name, gender, address, place & date born, class blood, religion, education, work, status marriage, Number telephone, that insurance used
2	History Visit	Date of visit, level of consciousness, weight body weight, height, blood pressure (systole & diastole), respiratory rates, hearts rates, subjective, objective, assessment, plan, icd-10, icpc, service support medical, Continuation maintenance (treat road/ referenced)
3	Allergy	Type allergy, reaction
4	Style Life	Consumption alcohol, consumption cigarette, type though body, type diet
5	Immunization	Type immunization, age gift immunization, Information
6	History Operation	Name action operation, age, information
7	Disease History Previously	Name disease, information
8	Disease History Family	Name member family, Name disease

Data Source:Primary

Hope user related with record medical electronic is order record system electronic medical that is designed to produce report formats that are desired so that users do not need to manually record data.

3.1 Design

The next stage of the electronic medical record after the needs analysis is carried out is design. This stage consists of process design, database design, and user interface design. The design created is based on the results of the system requirements analysis that has been done before.

3.1 Design Process

The process design is described with a data flow chart. The design diagram for the electronic medical record of the Kusmahati Dua Sukoharjo Clinic can be seen in Figure 1.

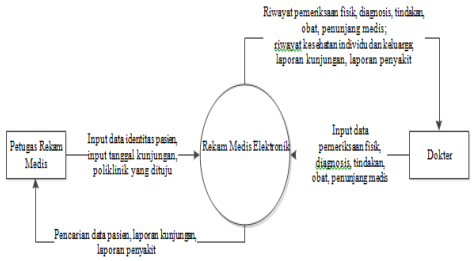

Figure 1. RME Planning Diagram

There are two external entities that interact with the electronic medical record system, namely medical record officers and doctors. The medical record officer inputs patient identity data, date of visit, and the intended

polyclinic, and can search for identity data of patients who have visited previously, access visit reports, and disease reports. Doctors take data from previous patient visits as a basis for serving patients. The data includes a history of physical examination, diagnosis, actions, prescription drugs given, results of medical investigations, and family health history. The doctor then inputs the service data that has been provided to the patient and can access disease reports and visit reports.

3.2 User *Interface* Design

user design is also made *the interface* is in the form of a sketch of the display design and an electronic medical record form Clinic Kusmahati Dua Sukoharjo. The design was presented to the owner and officers at Kusmahati Clinic to get input.

In the main design, there are 4 menus that officers can choose when accessing. The patient page is used for the registration process for patients who will carry out examinations at the Kusmahati Dua Sukoharjo Clinic. On the Doctors page, this page is specifically accessed by examining doctors. This page contains columns that the doctor will fill in when examining a patient. Then the next page is the Drug menu page. This page can be accessed by pharmacists to carry out pharmaceutical services that have been written by doctors on the Medicines menu. Officers can see the prescription written by the doctor after carrying out the examination. On the next page there is a report menu that can be accessed by medical record officers to retrieve service reporting data.

3.3 System Build

Database design and *user interface design* that has been made in stages previously Then embodied become A record medical web-based electronics.

Users can access electronic medical records using *a web browser* by typing the address http://localhost/rme in *the address bar.* In *the web browser* a login page will appear and the user will be asked to enter *a username* and *password* in order to use the system. If the login process is successful, the main page of the system will appear on the screen which consists of 4 main menus, namely patients, doctors, drugs, and reports.

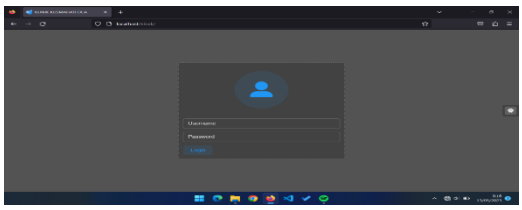

Figure 3. 2Login Page

On the login page, the officer must enter the username and password according to the access code for each officer. For example, the registration officer uses *username* : admin and *password* : admin123. With the access code for each officer, data security at the Kusmahati Dua Clinic can be well maintained because only certain officers can access the system.

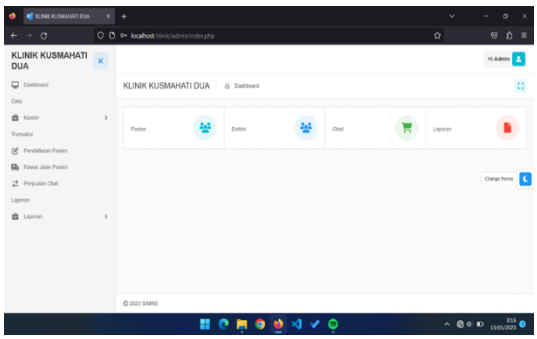

Figure 3. 3Main Page

The registration menu is used to register visiting patients to get health services. If the patient has never visited the Kusmahati Clinic before, the user must first record the patient's identity using the new patient input menu. If the patient has previously visited the Kusmahati Dua Sukoharjo Clinic, the user only has to look for the patient's data and then register according to the destination polyclinic.

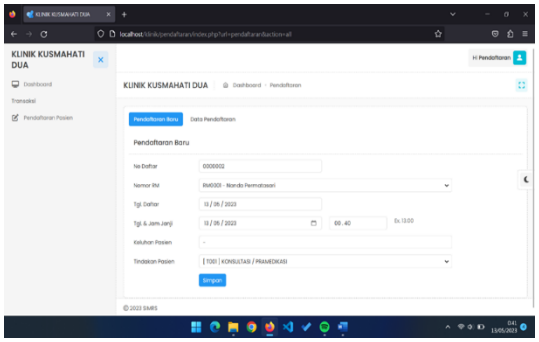

Figure 3. 4Patient Registration

All data entered by the user can be automatically recapitulated by the system according to the required report format. In the electronic medical record of the Kusmahati Dua Clinic, a report of the actions that have been taken is provided. The report format can be accessed via the report menu on the main page.

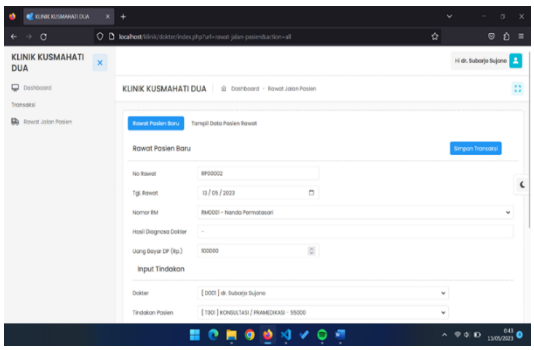

Figure 3. 5Doctor's Page

The doctor's page contains fields that must be filled in by the doctor when the patient is undergoing treatment. This is used in addition to knowing the amount of patient care costs as well as for reporting.

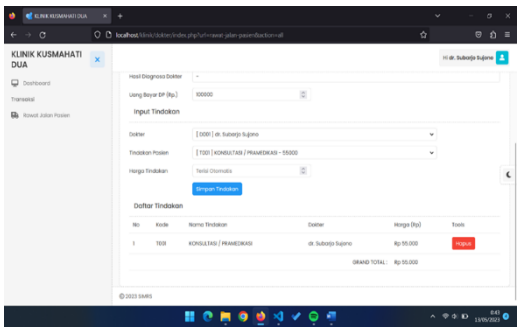

Figure 3. 6Doctor Fee Page

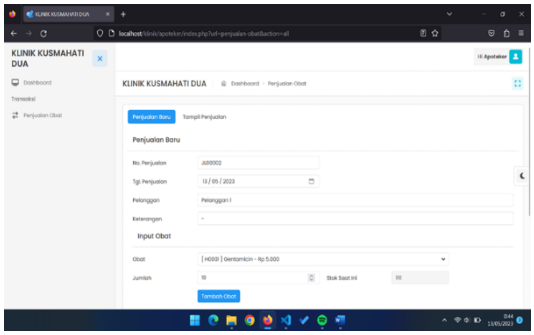

Figure 3. 7Medication Pages

After the patient has finished the examination the doctor will write down the diagnosis and prescribe medication for the patient. After the doctor writes the prescription, the pharmacist enters the drug code or drug name written by the doctor, and the medicine clerk writes the patient's name in the customer column. In the drug column, the price of the drug has been listed, which was entered by the officer before the application was used. When the officer enters a list of drug names and prices, the officer also enters the amount of Pbat stock in the pharmacy. This can make it easier when reporting and pharmacists can detect drug stocks that are running out early and can re-procure them. After the officer has finished entering the drug data, the patient's drug price will appear, which later the patient's total drug price will appear at the cashier.

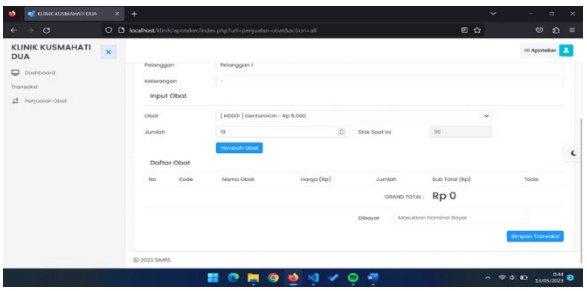

Figure 3. 8Drug Price Pages

The amount of patient drug payments will be accessed by the cashier. In the paid column, the clerk enters the amount paid by the patient. Before the patient takes the drug, the patient makes an administrative payment for the medication to the cashier. Proof of drug sales containing sales number, patient name, date of purchase, name of drug taken, total and initials.

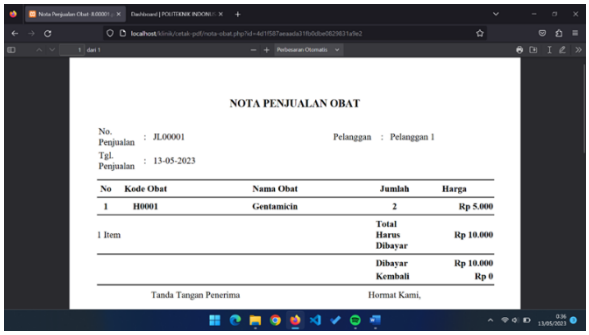

Figure 3. 9Proof of Drug Sales

Then the admin user is used to edit an officer's data or add. The admin referred to here is addressed to the Kusmahati Dua Sukoharjo Clinic manager where the admin can add and or edit data if there are additional officers. Access that can edit the system can only be accessed by the admin, so that officers who can use the system such as registration officers, doctors, pharmacies, and cashiers cannot edit and add data.

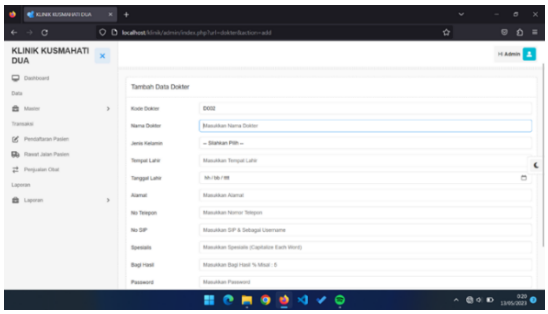

Figure 3. 10Adding Doctor Admin Pages

Then apart from adding and removing officers, the admin can change the price of drugs sold in pharmacies. This makes it easier for clinic managers to monitor drug sales.

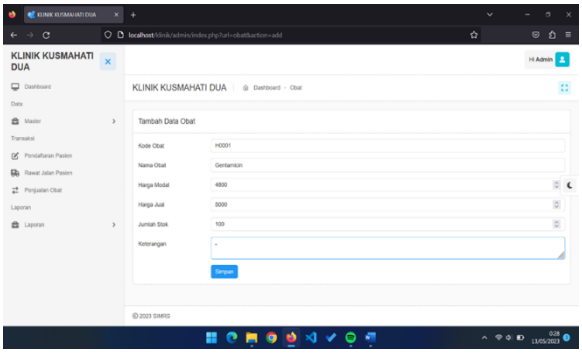

Figure 3. 11Drug Price Admin Pages

On the reporting page, the admin can access reports on service activities at the Kusmahati Dua Sukoharjo Clinic. Reporting of officer data, then reporting of doctors and drug sales. Doctor data reporting includes patient examination data along with the doctor's diagnosis.

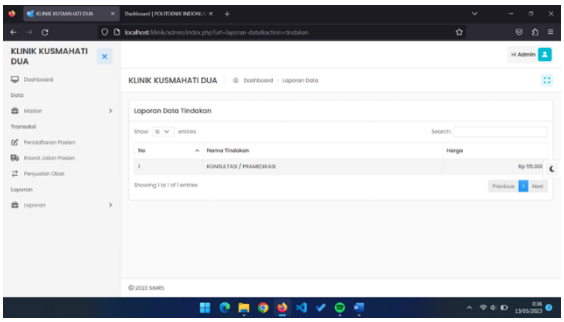

Figure 3. 12Doctor's Examination Reporting

3.4 Testing

A software needs to maintain its quality, quality depends on customer satisfaction, namely the Kusmahati Dua Sukoharjo Clinic. So it is necessary to test the software before the software is handed over to the customer. The test used for the application of the Electronic Medical Record Service System is black box testing. Black box testing is testing to find out whether all the built system functions can run according to their functions or not.

Patient registration testing

Table 3. 2Testing patient registration

Activity	Which expected	Observation	Information
Write down the patient's identity	Stored identities and medical record numbers in order	Patient data can be stored.	Succeed
Edit patient registration data	Can add or delete registration data	Patient data can be edited and deleted.	Succeed

Source: Primary Data

Physician page testing

Table 3. 3Doctor's Page Test

Activity	Which are expected	Observation	Information
Fill in and save the patient's treatment actions	Doctors can fill out and save transactions	Patient data successfully saved	Succeed
Filling the action of patient treatment	The doctor can fill in the actions carried out along with the service fee	Can be loaded and stored	Succeed

Drug Page Testing

Table 3. 4Drug Page Testing

Activity	Which are expected	Observation	Information
Choose the patient's drug name	The name of the selected drug appears along with the price	The drug name can be selected and the price appears	Succeed

Based on the tests carried out above using black box testing, this decision support system can run as expected. There are no visible errors while using the system, and all system functions that are built can run according to their functions.

4. DISCUSSION

First-level health facilities apply the family folder concept in managing their medical record records so that in one medical record file there are several documentations of family members' medical history so that the level of family health can be known (Khasanah & Rosyidah, 2018). The problem that often occurs is the messy preparation of files because in one folder there are several sheets of medical records for each family member. It takes a lot of time to trace the medical history of certain family members if the medical records are not arranged in an orderly and tidy manner. Tracing the medical history of patients and their family members can be done more quickly using electronic medical records.

The electronic medical record of the Kusmahati Dua Sukoharjo Clinic stores patient identity data, visit history, anamnesis, results of physical examination, diagnosis, management plan, and supporting examinations. This is in accordance with the requirements of RI Minister of Health No. 269/MENKES/PER/III/2008 concerning Medical Records. Then according to its function as a family doctor's medical record, the electronic medical record of the Korpagama Family Doctor Clinic also stores

Activity	Which are expected	Observation	Information
Write down the registered username and password	Displays *username* and password when successfully inputted	The written text displays the username	Succeed
Write down the registered username and password	Displays *login failed message*	The text displayed is "Sorry, *the username/password* doesn't match	Succeed

family health history. Also included is data about the pattern or lifestyle of patients and families.

In the era of national health insurance, first-level health care facilities that cooperate with BPJS, including the Sukoharjo Kusmahati Dua Clinic, are required to use the p-Care software, which can be accessed online. The problem that occurs at first level

health service facilities is that there is double entry on p-Care and on the software that each first level health service facility has, thus increasing the workload.

4.1 Design and manufacture

According to the Law of the Republic of Indonesia number 23 of 2006 concerning population administration, a Population Identification Number (NIK) is a resident identity number that is unique or distinctive, single and attached to a person who is registered as a resident of Indonesia. With a unique identity attached to every Indonesian resident, it is also possible for the Kusmahati Dua Sukoharjo Clinic electronic medical record system to be implemented with a wider scope, for example used in first-level health facilities throughout Indonesia.

The electronic medical record system developed at the Kusmahati Dua Clinic is a web-based information system. With the wider distribution of internet use around the world, the access to and need for web-based information systems is getting higher. The web-based information system is open source based and can be accessed anytime and from anywhere using a web browser and internet network without having to install it on each user's computer first. This is an advantage of web-based information systems compared to desktop-based information systems which are closed source and must first be installed on each user's computer. Web-based information systems have convenience in terms of system updates and maintenance because it is enough to do the source code on the server computer. In addition, because of its open source nature, web-based information systems can be further developed by other parties who are interested in developing and continuing this research. The electronic medical record at the Kusmahati Dua Sukoharjo Clinic was developed.

This study is in line with the results of the distribution of questionnaires that were carried out, it was recorded that 30 Medical Recorders and Health Information showed that, 2% of Medical Recorders and Health Information strongly disagreed, 5% of Medical Recorders and Health Information did not agree, 20% of Medical Recorders and Health Information somewhat disagreed. agree, 33% Medical Recorder and Health Information agree, 40% Medical Recorder and Health Information strongly agree that the application of Electronic Medical Record is effective for aspects of goals or ideal conditions in Outpatient services [10].

5. CLOSING

Conclusion

Based on the results of research conducted at the Kusmahati Dua Sukoharjo Clinic, it can be concluded that there is a need for records Kusmahati Dua Sukoharjo Clinic medical care includes:

a. Able to store and display patient identity data, visit history, allergy records, lifestyle, immunizations, surgery history, past medical history, and family disease history.

b. Electronic Medical Records are able to provide solutions to increasingly narrow storage space and patient file security.

A web-based electronic medical record has been designed for the Kusmahati Dua Sukoharjo Clinic and is ready to be submitted to the Kusmahati Dua Sukoharjo Clinic owner for follow-up.

Suggestion

Based on the conclusions above, the researcher would like to provide some suggestions as follows:

For the Kusmahati Dua Sukoharjo Clinic

1. Electronic medical records are implemented in service activities at the Kusmahati Dua Sukoharjo Clinic so that they can be devaluated and developed further.
2. Electronic medical records are implemented in other first-level health facilities and integrated nationally.

6. THANK-YOU NOTE

Having completed this research, the authors express their gratitude to: Director of the Kusmahati Dua Sukoharjo Clinic, supervisors and other parties involved in it who have provided suggestions and input for the improvement of this paper.

7. REFERENCE

[1] R. M. Kosanke, "Analisis Rekam Medis Elektronik Pada Klinik," pp. 1–5, 2019.
[2] Mc Leod, "Sistem Informasi Menurut Ahli," 2020..
[3] O. Jaringan, "Pengertian Jaringan Menurut Para Ahli," 2020..
[4] M. Tata Sutabri, Kom., "Siste Informasi," 2020..
[5] D. B. Santoso, N. Nuryati, and A. E. Pramono, "Pengembangan Rekam Medis Elektronik Berbasis Software as a Service (SaaS) bagi Dokter Praktik Mandiri," *J. Kesehat. Vokasional*, vol. 5, no. 3, p. 168, 2020.
[6] permenkes nomor 209/MENKES/PER/III/2008, "Pengertian Rekam Medis."
[7] D. M. A. D. Prawiradirjo, B. H. Kartiko, and G. Feoh, "Perancangan Sistem Informasi Rekam Medis Elektronik Rawat Jalan Berbasis Web Di Klinik Gigi Bright Smiles Bali," *J. Teknol. Inf. dan Komput.*, vol. 4, no. 1, pp. 31–41, 2018.
[8] Poerwanta, "Database dan Basis Data," 2018..
[9] M. Fikri Paturahman, V. Yasin, and R. Haroen, "Rancang bangun aplikasi booking Lapangan Futsal pada Kevin Futsal berbasis Android," *J. Widya*, vol. 2, no. 1, pp. 60–74, 2021.
[10] T. Latipah, S. Solihah, and S. Setiatin, "Pengaruh Rekam Medis Elektronik Terhadap Peningkatan Efektivitas Pelayanan Rawat Jalan di Rumah Sakit X," *Cerdika J. Ilm. Indones.*, vol. 1, no. 10, pp. 1422–1434, 2021.